



INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

Dated 6 June 2003



100

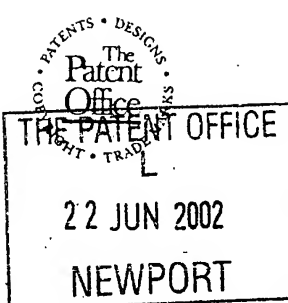
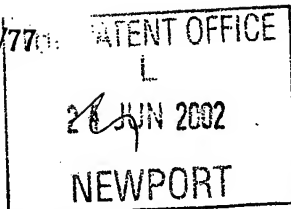


100

100

Patents Form 1/77

Patents 1977
(Rule 16)



1/77

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

22 JUN 2002

1. Your reference

P/6761

2. Patent application number

(The Patent Office will fill in this part)

0214478.0

25JUN02 E728054-1 001607
P01/7700 0.00-0214478.0

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

- 1) CNH U.K. Ltd., Cranes Farm Road, Basildon
ESSEX SS14 3AD 8349532001
 - 2) Iveco (UK) Ltd, Iveco Ford House, Station Road,
Watford, HERTS WD1 1SR 7460603001
 - 3) Cummins Engine Company Limited, Yarm Road,
Darlington, County Durham DL1 4PW
- All three British companies. 5615224002

4. Title of the invention

Internal Combustion Engine

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom
to which all correspondence should be sent
(including the postcode)

A. Messulam & Co. Ltd
43-45, High Road
Bushey Heath
Herts WD23 1EE

Patents ADP number (if you know it)

07636210001 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

Yes

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description

Claim(s)

Abstract

Drawing(s)

6

2

1

1

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

To follow

1

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date

A. Messulam

21 June 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

A. Messulam Tel: 020 8421 8197

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

INTERNAL COMBUSTION ENGINE

Field of the invention

5 The present invention relates to an engine having an oil dipstick and is concerned in particular with the retention of the dipstick on the body of the engine.

Description of the prior art

10

In agricultural vehicles, it is not practical to add engine oil for lubrication by pouring it into a valve cover at the top of the engine. For this reason, it is known to use the access hole for the dipstick as the filler hole for adding oil to the engine. When the dipstick access hole is made larger to permit oil to be poured into the engine through it, there is an increased tendency for the dipstick to be ejected by the crankcase pressure acting on the cap closing off the filler hole.

20

An oil filler tube assembly for an internal combustion engine that mitigates this problem is disclosed in US Patent No. 5,702,495. This assembly includes a tube having a lower end communicating with the crankcase of the engine and an open upper end that is enclosed by a cap. The under surface of the cap carries a dipstick which extends downwardly within the tube. The upper end of the tube has a pair of locking elements which are spaced circumferentially with the spaces between the elements being of different circumferential dimension. The cap of the dipstick is constructed in a manner that resembles a conventional engine radiator cap, the cap having a peripheral flange of which the lower edges has a pair of locking lugs of different circumferential dimension. The locking lugs on the cap are constructed and arranged to be received within the spaces between the locking elements of the tube as the cap is inserted on the tube. The locking elements and the locking

lugs are provided with mating cam surfaces so that when the cap is rotated one quarter of a turn, a seal on the under surface of the cap will be forced against the upper end of the tube to tightly seal the cap to the tube.

5

Object of the invention

The present invention seeks to provide an arrangement that permits the dipstick to be securely held in place without requiring the additional cost and complexity of forming special locking elements on the body of the engine and on the cap of the dipstick.

15

Summary of the invention

According to the present invention, there is provided an engine comprising :

a body that includes a cylinder block and a crankcase,
a hole formed in the engine body and communicating at
20 its lower end with the crankcase,
a cap for closing the mouth of the hole, and
a dipstick depending from the underside of the cap
which reaches through the hole into the crankcase in order
to enable the oil level in the crankcase to be determined,
25 characterised in that
the engine body is formed with an overhanging lip
adjacent the mouth of the hole, and
the cap comprises a spigot rotatably received in the
mouth of the hole and a flange extending radially outwards
30 from the spigot to cover the mouth of the hole, the flange
being non-circular so that by rotation of the cap relative
to the hole, a radially projecting portion of the edge of
the flange may be selectively engaged beneath the
overhanging lip to prevent axial displacement of the cap and
35 the dipstick relative to the engine body. .

In a preferred embodiment of the invention, the engine body is formed of a cylinder block and a separate cast oil sump secured to the cylinder block, the hole for the dipstick is formed in the oil sump casting and the
5 overhanging lip is formed by a part of the cylinder block, or of a gasket disposed between the cylinder block and the oil sump, that projects laterally beyond the oil sump. It will be noted that the face of the cylinder block mating with the oil sump is always machined flat and any gasket
10 used to seal between cylinder block and the oil sump will also have a smooth flat surface. Consequently, when the engine is formed in this manner, the overhanging lip will present a smooth face past which the edge of the flange on the cap can glide easily without requiring an additional
15 machining step.

Advantageously, the spigot is cylindrical and has an outer diameter slightly smaller than that of the hole, an annular groove being formed in the outer surface of the
20 spigot to receive an O-ring for effecting a seal between the cap and the hole. Because the O-ring acts as a radial seal rather than as an axial end seal, the engagement of the flange beneath the lip is not called upon to apply an axial force to effect a seal between the flange on the cap and the
25 engine body. The engagement of the flange serves only to ensure that the cap is not dislodged by the pressure in the crankcase.

When the dipstick is inserted into a hole formed in the
30 oil sump, it does need to be long in order to reach into the oil reservoir in the crankcase. It is therefore practicable to form the dipstick integrally with the cap, the two being preferably formed as a single plastics injection moulded part.

35

Conveniently, the spigot that is inserted into the mouth of the hole may be formed with radially deformable

gripping claws that resiliently and frictionally engage the surface of the hole to retain the spigot within the hole.

Brief description of the drawings

5

The invention will now be described further, by way of example, with reference to the accompanying drawings, in which :

Figure 1 is a perspective view of a combined dipstick
10 and oil filler cap,

Figure 2 is a partial section through the lower end of an engine showing the dipstick of Figure 1 in situ in an engine oil filler hole, and

Figure 3 is a plan view of the oil filler cap of
15 Figure 2 during its mounting in the oil filler hole.

Detailed description of the preferred embodiment

The combined dipstick and oil filler cap 10 shown in
20 the drawings comprises a dipstick portion 22 formed integrally with a cap 12, the two being formed as a one-piece injection moulded component. The cap 12 comprises a cylindrical spigot 19 dimensioned to fit in the oil filler hole, designated 40 in Figure 2. The upper part of the
25 spigot 19 is formed with an annular groove 14 which receives an O-ring 24 that seals against the cylindrical wall of the filler hole 40. The lower end of the spigot 19 has two resilient claws 21 that frictionally grip the filler hole so that the spigot fits snugly in the filler hole 40.

30

A flange 16 extending radially from the spigot 19 covers the mouth of the hole. The flange 16 is non-circular, being provided with a radially projecting locking finger 18. Additionally, the cap has a projecting disc 20
35 by means of which the cap can be manually gripped and turned.

The body of the engine is formed with an overhanging lip 34 beneath which the projecting finger 18 can engage in order to retain the cap and dipstick 10 within the oil filler hole 40 against the action of the pressure that builds up within the crankcase of the engine as a result of gases that leak past the engine pistons.

Figure 2 shows how a suitable overhanging lip can be formed without any additional machining step. In Figure 2, the oil filler hole 40 is formed as part of a cast sump 30 having an oil reservoir 36. Agricultural vehicles often use structural engines, which are so called because the engine and transmission form part of the vehicle chassis and are relied upon for structural rigidity. In such engines, the oil sump is formed as a substantial casting because it is not only used as an oil reservoir but to stiffen the engine block. The oil sump 30 is bolted on to the underside of the cylinder block 32 with the interposition of a suitable sealing gasket 38. The mating surfaces of the cylinder block 32 and the oil sump 30 are of course machined flat in order to achieve an effective seal.

The cylinder block 32 in Figure 2 is cast with a projecting lip 34 that overhangs the oil sump 30 in the vicinity of the mouth of the filler hole 40. Instead of forming the cylinder block with a projecting lip, an overhanging lip may be formed by providing a projection on the sealing gasket 38.

The provision of the overhanging lip 34 on the engine body and a projecting finger 18 on the filler cap, permits the cap to be held in place in a very simple manner. To close the filler hole 40, the spigot 19 of the cap 12 is first pushed into the filler hole 40. The claws 21 are pressed towards one another by this action and their resilience enables them to grip the wall of the hole 40 and thereby provide a snug fit. With further insertion, the

O-ring 24 enters the filler hole 40 and seals the mouth of the hole. Finally the flange 16 comes to rest against the mouth of the hole.

5 The cap 12 can then be rotated counter-clockwise from the position shown in Figure 3, by gripping and turning the disc 20 until the projecting finger 18 engages under the lip 34. The upper surface of the projecting finger 18 can be
10 shaped as a cam that tightens the engagement under the lip 34 as the cap 12 is turned. With the finger 18 so engaged, the oil filler cap and dipstick is firmly held in place and can readily withstand crankcase pressure.

15 The level of the oil in the crankcase can be checked by first rotating the cap 12 to free the finger 18 from beneath the lip 34 then pulling the cap and dipstick out of the hole 40. The oil film on the dipstick 22 can then be checked against minimum and maximum markings in the normal manner to
20 ascertain if more oil is needed. If oil is needed, it is poured directly into the sump reservoir 36 through the hole 40, using a funnel or a spout if necessary.

25 It will be appreciated that various modifications may be made to the described embodiment without departing from the scope of the invention as set out in the appended claims. For example, in place of a projecting finger 18 the flange may be formed with a flat.

CLAIMS

1. An engine comprising :
a body that includes a cylinder block and a crankcase,
5 a hole formed in the engine body and communicating at
its lower end with the crankcase,
a cap for closing the mouth of the hole, and
a dipstick depending from the underside of the cap
which reaches through the hole into the crankcase in order
10 to enable the oil level in the crankcase to be determined,
characterised in that
the engine body is formed with an overhanging lip
adjacent the mouth of the hole, and
the cap comprises a spigot rotatably received in the
15 mouth of the hole and a flange extending radially outwards
from the spigot to cover the mouth of the hole, the flange
being non-circular so that by rotation of the cap relative
to the hole, a radially projecting portion of the edge of
the flange may be selectively engaged beneath the
20 overhanging lip to prevent axial displacement of the cap and
the dipstick relative to the engine body.
2. An engine as claimed in claim 1, wherein
the engine body is formed of a cylinder block and a
25 separate cast oil sump secured to the cylinder block,
the hole for the dipstick is formed in the oil sump
casting, and
the overhanging lip is formed by a part of the cylinder
block that projects laterally beyond the oil sump.
- 30 3. An engine as claimed in claim 1, wherein
the engine body is formed of a cylinder block and a
separate cast oil sump secured to the cylinder block,
the hole for the dipstick is formed in the oil sump
35 casting, and

the overhanging lip is formed by a part of a gasket disposed between the cylinder block and the oil sump that projects laterally beyond the oil sump.

5 4. An engine as claimed in any preceding claim, wherein

 the spigot is cylindrical and has an outer diameter slightly smaller than that of the hole,

 an annular groove is formed in the outer surface of the
10 spigot, and

 an O-ring is fitted within the annular groove to effect a seal between the cap and the hole.

 5. An engine as claimed in any preceding claim,
15 wherein the dipstick is formed integrally with the cap.

 6. An engine as claimed in claim 5, wherein the dipstick and cap are formed as a single plastics injection moulded part.

20

 7. An engine as claimed in any preceding claim, wherein the spigot that is inserted into the mouth of the hole is formed with radially deflectable gripping claws that resiliently and frictionally engage the surface of the hole
25 to retain the spigot within the hole.

 8. An engine constructed substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

30

ABSTRACT

INTERNAL COMBUSTION ENGINE

5 An engine is described having a hole 40 for a dipstick
22 which is closed by a cap 12 from which the dipstick 22
depends. The engine body is formed with an overhanging lip
34 adjacent the mouth of the hole 40, and the cap 12
comprises a spigot 19 rotatably received in the mouth of the
10 hole 40 and a flange 16 extending radially outwards from the
spigot to cover the mouth of the hole 40. The flange 16 is
non-circular so that by rotation of the cap relative to the
hole, a radially projecting portion 18 of the edge of the
flange 16 may be selectively engaged beneath the overhanging
15 lip 34 to prevent axial displacement of the cap and the
dipstick relative to the engine body.

Figure 2.

